

they reach the limb, but the *white* detail sticks out beyond it; so that irradiation has a good deal to answer for.

Now I assert that the white patch is not continuous with the surface of the solid, but stands above it; and the evidence I adduce that such is the case consists simply in the shadow of the white patch, which could recently be seen to the eastward after the planet had passed its opposition. My first memorandum of this appearance is dated September 28 at 9^h, definition being on that occasion the very finest I have had this autumn.*

The first occasion on which the gibbosity of the disk was noticed was the 5th of October. It was then conspicuous.

The only hypothesis I offer respecting the white polar patch is that it consists of cloud: the neighbourhood of the pole being supposed to be the only region cool enough to condense the vapour.

There is no doubt that cloud would be bright enough, compact enough, and definite enough to supply all the observed peculiarities.

The Earth can show nothing whiter or more sharply defined than its cumulous clouds; and in *Mars*, if the temperature is so great as to dissipate them everywhere else, it is presumable that they would, even at the pole, form themselves only at the outer regions of the atmosphere.

This hypothesis accounts both for the apparent projection and the visible shadow.

The sum of my autumn's work upon *Mars*, therefore, is not only disappointing but grievous. The snows I am sure must be given up, and I sadly fear the seas must go too; and the one little companion globe in the whole solar system on which we could depend has its character taken away.

P.S. Since the 9th of October a patch of light has been noticed to the N.W. of the polar patch, of a diffused character, probably caused by specular reflexion from the outer surface of the envelope, since it is believed not to be affected by the rotation. This requires further observation.

November 9, 1877.

Notes on Mars, 1877. By H. Pratt, Esq.

Opportunities of observing the planet have not been numerous, for the weather here has often been indifferent. Yet on several occasions when definition has been really fine some of the markings have been very definite, and although the majority presented softened outlines, yet their complexity could only be realised by close and patient attention. On such occasions the number and variety of curved forms has been constantly remarked.

* It cannot be seen with ordinary definition.

In moments of the finest definition the markings have exhibited a *stippled* rather than a streaked character, and glimpses were obtained of a structure so complicated and delicate that the pencil cannot reproduce it, for the visual perception of it was too transient to be retained. Frequently what at first sight appeared as a broad hazy streak has been, by patient watching for the best moments, resolved into several separate masses of shading enclosing lighter portions full of very delicate markings. The spaces enclosed by the markings were sometimes of the general reddish tint, and occasionally almost white.

From the discrepancies that will occur between the most careful drawings of the same side of the globe made on different nights, and from the difficulty of the identification of the forms shown by the published drawings of previous observers, it has been difficult to believe that the perfect and *complete* form of any particular marking is ever seen on any one occasion. Hence the multiplication of careful drawings appears the only way to arrive at a fair knowledge of the features of the planet.

The persistence with which many well-known markings recur again and again during many years, as they have recurred from night to night during the present season, surely proves their connection with the globe itself rather than with its atmospheric envelope. And yet the difference in the details of any one form as seen with the same instrument, by the same observer, on different occasions, while our own atmosphere has been equally clear, as tested by reference to *Saturn*, surely points to variations in the opacity of the aerial envelope of *Mars* as the cause. Indeed, the idea of *local obscurations* as from a cloudy condition of the planet's atmosphere has seemed sufficient to account for many such discrepancies, though why certain forms should be visible at one time, and either *obliterated* or *greatly modified* at another time, it is not easy to decide. Drawings II. and VI. illustrate these difficulties.

The *exaggeration of the polar cap* by irradiation, which causes it at times apparently to extend beyond the planet's limb, has been observed a few times, but only on nights which, for other reasons, were deemed insufficiently good for any delicate observation. On the finest nights the polar cap has always appeared precisely as if it formed a portion of the actual surface of the globe.

On every occasion of really good definition the markings were most easily made out on the following limb, and often very closely approached it, as was remarked by Capt. Noble and others at the November meeting.

Although generally the atmospheric envelope of *Mars* has appeared clear by allowing the markings to be well seen, yet frequently the great difficulty of detecting any markings at all over large regions where markings undoubtedly do exist has seemed to indicate the existence of a partially opaque condition, although no well-defined cloud-masses like those observable on *Jupiter* were ever detected. That this effect was not caused by our own atmosphere has been proved by the superior definition

of *Saturn* at a lower altitude. This has occurred on different occasions, and is instanced on November 14, when, in the S.W. quadrant, the region bounded by the curved shading shown on Drawing VI. was of that character, and the whole region was whitish, the otherwise prevailing red tint being absent.

On every observing night this season the prevailing tint of the red portions of the planet has been much paler than during recent oppositions.

The general colour of the markings has appeared of a neutral gray, that of the most intensely marked portions inclining to bluish. Not the slightest trace of green has been detected.

The intense whiteness of the polar caps during August has gradually declined in purity of tint since then, becoming more nearly the same as the limb.

On all sides towards the limb the redness has always paled rapidly almost to white.

The six drawings accompanying these notes are selected from a series, and refer to nights when the best definition prevailed.

The longitudes appended are derived from Mr. Marth's Tables.

The instrument a Newtonian Equatoreal, speculum by With, of 8.15 in. aperture, diagonal prism of fine quality, power 400 single achromatic.

The Approximate Fraction Elements of Solar System.

By S. M. Drach, Esq.

In the weekly *English Mechanic* for June 16 and July 7, 1871, a writer signing himself G. F. H. gave remarkably close and simple approaches to the orbital mean distances and eccentricities, which I think ought to be specially recorded in the *Monthly Notices*. I have corrected the faulty 487 of *Saturn's* denominator, and extracted the factors:

Mercury	.3870981 - .0000013 =	$\frac{12}{31}$;
Venus	.7233316 +	$17 = \frac{217}{300}$, or $\frac{7.31}{10.30}$;
Earth	1 -	00 = 1;
Mars	1.5236923 -	$15 = \frac{611}{401}$, or $\frac{13.47}{401}$;
Jupiter	5.2027760 +	$18 = \frac{1873}{360}$, or $\frac{11.31.131}{6.27.53}$ true;
Saturn	9.5387861 -	$30 = \frac{4550}{477}$, or $\frac{5.7.13}{9.53}$;
Uranus	19.1823900 -	$01 = \frac{4051}{159}$, or $\frac{4051}{3.53}$;
Neptune	30.0566000 +	$40 = \frac{1593}{53}$, or $\frac{27.59}{53}$.

Remark the 1, 3, 9, 27 times 53.